Time Critical Diagnosis—Stroke and STEMI System Implementation
May 12, 2009 Meeting Highlights

ATTENDEES:

Dr. Samar Muzaffar, Department of Health and Senior Services (DHSS); Paula Adkison, DHSS; Tony Adams, HCA Midwest Healthcare; Mark Alexander, CoxHealth; Dr. Lynthia Andrews, Heartland Regional Medical Center; Dr. Richard Bach, Washington University School of Medicine; Kristi Baden, Boone Hospital Center; Ryan Barker, Missouri Foundation for Health; Dave Barringhaus, Physio-Control; Steve Bassett, Ozark Medical Center; Jack Bates, Air Evac Lifeteam; Anita Berwanger, DHSS; Nancy Bettasso, St. John's Regional Medical Center; Linda Black, Pike Memorial County Hospital; Linda Brown, Southeast Missouri Hospital; Chris Byrd, Southeast Missouri Hospital; Dr. W. Stephen Casady, Putnam County Hospital; Annette Casey, Missouri Baptist Medical Center; Angela Christesen, Salem Memorial District Hospital; Doug Clark, Hermann Area EMS; John Clemens, Marion County Ambulance District; Karen Connell, DHSS; Monti Cooper, Southeast Missouri Hospital; Richard Cotter, Taney County Ambulance District; Adrianne Courter, I-70 Medical Center; Rich Dandridge, Warren County Ambulance District; Lewis Daniel, Boone Hospital Center; Susan Davis, St. John's Mercy Medical Center; Linda Dean, Freeman Health System; Liz Deken, American Heart Association; Lisa Donnelly, St. Luke's Hospital; Joan Drake, Staff for Life Helicopter; Mary Jo Draper, The Vandiver Group; Valerie Dutcher, Heartland Regional Medical Center; Joan Eberhardt, Missouri Emergency Nurses Association; Katie Egan, Barnes Jewish Hospital; Donna Ehler, Centerpoint Medical Center; Rhonda Evans, Community Hospital Association; Jacqueline Euritt, Research Medical Center; Aisha Ewing, Northeast Ambulance District; Kelly Ferrara, The Vandiver Group; Brian Fields, Northeast Ambulance and Fire Protection District; Nick Frey, Stinson, Morrison & Hecker; Linda Freymuth, Lincoln County Ambulance District; Dolly Giles, Pike County Memorial Hospital; Bryant Gladney, Boone Hospital Center; Martha Gragg, Missouri Foundation for Health; Dale Green, PRN Healthcare Consultants; Paul Guptill, Missouri Hospital Association; Dr. David Gustafson, Medical Director; Robin Hamann, American Heart Association; Dr. Kathryn Hedges, Lee's Summit Medical Center; Kathleen Henderson, St. Joseph Medical Center; Michael Hicks, Mid American Regional Council; Dr. Stuart Higano, Missouri Baptist Medical Center; Chris Hoag-Apel, Freeman Health; Dr. Eric Hockstad, Research Medical Center; Sara Howard, The Vandiver Group; Lindy Huff, St. Luke's Hospital; Lisa Hutchison, St. John's Regional Health Center; Judy James, American Heart Association; Stacey Jett, Boone Hospital; Freida Juliano, Hannibal Regional Hospital; Melissa Kaufman, Audrain Medical Center; Mike Kendrick, Des Peres Hospital; Daniel Kernebeck, Qual-Rx, Inc; Shelleen King, St. Luke's Hospital of Kansas City; Dr. George Kichura, St. John's Mercy Heart & Vascular; Leigh Kite, University Hospital and Clinics; Mary Kleffner, DHSS; Dr. Michael Klevens, St. Luke's Hospital; Darsy Kneer, Northeast Ambulance and Fire Protection District; Julie Kohm, St. Genievieve County Memorial Hospital; Kathy Lainhart, St. Luke's Hospital of Kansas City; Michelle Leassner, Des Peres Hospital; Dr. Jin-Moo Lee, Department of Neurology, Washington University; Theresa Lee, Community Hospital; Dr. Gwen Lehleitmer, Sanofi-Aventis Pharmaceuticals; Jennifer Lembeck, Sanofi-Aventis Pharmaceuticals; Katie Liberto, Physio-Control; Bonnie Linhardt, American Heart Association; Colin McCoy, St. Louis Fire Department; Dianne McCummiskey, Des Peres Hospital; Bryant McNally, Missouri Hospital Association; Polly McNeece, Research Medical Center; Deborah Markenson, DHSS; Dr. Steve Marso, Cardiovascular Consultants; John Martin, Slater Ambulance District; Chris Medlin, Capital Region Medical Center; Bill Meeker, Laredo Fire Department; Ruby Mehrer, Lifeflight Eagle; Darla Merideth, St. Joseph Hospital West and St. Joseph Health Center; David Meyer, Bristol-Myers Squibb; Linda Meyer, Hermann Area District Hospital; Michele Meyer, Des Peres Hospital; Sharon Monical, Missouri Baptist Medical Center; Greg Natsch, DHSS; Carol Nierling, University Hospital and Clinic; Nancy Noedel, St. Louis University; William Pearman, Chariton County Ambulance District; Cynthia Peters, St. Mary's Medical Center; Joe Piskulic, Jefferson Memorial Hospital; Debbie Playter, Audrain Medical Center; Sharon Pulver, St. Joseph Health Center; Dakota Redd, Des Peres Hospital; Dr. Danelle Richards, St. John's Hospital-Lebanon; Dr. John Russell, Cape County Private Ambulance Service; Dr. Marilyn Rymer, St. Luke's Hospital; Dr. Joseph Salomone, Kansas City EMS/SAC; Wayne Sanders, West County EMS & Fire Protection District; Twany Sandifer, Capital Region Medical Center; Helen Sandkuhl, St. Louis University Hospital; Barb Seagrass, Des Peres Hospital; Heather Seemann, SSM St. Clare Health Center; Dr. Niranjan Singh, University of Missouri School of Medicine; Andrew Spain, University of Missouri Hospital and Clinics; Edward Spain, St. John's Regional Health Center; Courtney Spezia, Sanofi-Aventis Pharmaceuticals; David Stagner, St. Francis Medical Center; Chad Staley, Montgomery County Ambulance District; Mickey Stout, St. John's Hospital – Lebanon; Debbie Summers, St. Luke's Brain and Stroke Institute; Nancy Terveer, Missouri Baptist Medical Center; Daniel Thompson, HCA Healthcare; Jeff Torres, McGuire Woods LLP, Dr. Alan Umbright, SSM St. Joseph; Kathy Vickery, Southeast Missouri Hospital; Phyllis Vos, Research Medical Center; Myrna Ward, Southeast Missouri Hospital; Terri Waters, The Vandiver Group; Denise Webber, St. Mary's Health Center; Dr. Richard Webel, University of Missouri Health Care; Marilyn Welling, St. John's Regional Medical Center; Jason White, Metropolitan Ambulance Service Trust; Darrell Wright, Chillicothe Emergency Services; George Wright, Salt River Ambulance District; Monroe Yancie, St. Louis Fire Department; and Beverly Smith, DHSS.

General Information

A total of 137 people attended the seventh meeting of the Time Critical Diagnosis (TCD) Stroke and STEMI System implementation process. An orientation session preceded the meeting to provide an overview of the TCD system and the work that has been done to date. Dr. Muzaffar welcomed the group and provided a review of the tasks that have been completed. Products compiled by the work groups include: criteria for stroke and STEMI center regulations; general consensus on four levels of centers; medical dispatch protocol for TCD conditions; stroke emergency medical services (EMS) protocol; guidelines for stroke and STEMI patient classification and field triage;

drafts of inter-facility protocol for stroke patients; and beginning work on professional education plan for out-of-hospital personnel.

Patient Classification and Field Triage

An overview of triage principles used for care of trauma patients was provided by Dr. Muzaffar to inform discussions on the classification and field triage guidance documents for stroke and STEMI patients. Classifying patients enables EMS personnel to set priorities for emergency treatment and transport, and to determine the best destination for definitive care based on the severity of the patient's condition. Efforts are invested to assure that triage is appropriately sensitive and specific to minimize both over- and under-triage of the patient. These guidelines help reduce risks for death and morbidity for patients and emphasis is place on erring on the side of over-triage. Mature systems can evaluate and sets standards for acceptable levels of over-triage.

The group then subdivided into stroke and STEMI work groups to review current drafts of the field triage and classification schemes.

STEMI PATIENT CLASSIFICATION

The STEMI group proposed two classification categories for patients with STEMI. Class I includes those STEMI patients that have cardiogenic shock and class II are STEMI patients with no signs of cardiogenic shock. There was much discussion on how these classification guides can be used to assure that the "sickest" patients go to a level I center. The group identified challenges in defining a "one size fits all" approach due to the many variables relating to the transport time, distance, facility capacity and personnel across the state. Regional differences will require review, particularly differences between large rural areas and primarily metro areas. These regional differences may warrant modification of state approaches. It was agreed consistent language is of value on a statewide basis. When EMS personnel determine that a patient is not manageable in the field they should transport him or her to the nearest hospital and once stabilized transfer to a facility with Percutaneous Coronary Intervention (PCI) capacity.

STEMI CLASSIFICATION CRITERIA

Class I

- Cardiogenic shock
    - Elevated ST on ECG and exhibit two of the following additional symptoms:
        - Tachycardia, Heart Rate > 100
        - Hypotension, Systolic Blood Pressure < 90
        - Respiratory Distress, <10 or >29

Class II

- Elevated ST on ECG
- Signs and symptoms of acute coronary syndrome

STEMI FIELD TRIAGE GUIDELINES

The group next focused on review of the draft field triage guidelines. The law is specific about transport to an appropriate STEMI (and stroke) center unless life-threatening conditions warrant going to the closest hospital for stabilization prior to transfer to a STEMI (or stroke) center. There was discussion regarding the problems that can occur in rural areas where there are fewer ambulances and when an ambulance may have to travel out of their service area to transport a STEMI patient to a Level I or II center. If the ambulance is gone for an extended period of time this may leave the area with a gap in coverage. Viable solutions were identified, which include mutual aid agreements for coverage and use of air ambulance when appropriate. Each region may need to modify triage guidelines appropriately for their unique conditions. Attachment 1 details the STEMI Field Triage Guidelines.

STROKE PATIENT CLASSIFICATION

The group believed that classification of stroke patients is dictated by time since last known well instead of severity of the illness. Class I patients are those in which there is an immediate life threat.

STROKE CLASSIFICATION CRITERIA

Class I

- Immediate life threat

Class II

- Categorize patients based on the following times last known well
  - < 2 hours
  - 2-7 hours
  - > 7 hours

STROKE FIELD TRIAGE

The group discussed the best approach for field management of the stroke patient. The classification scheme guided this discussion on the transport decisions based on the numbers of hours since the patient was last known well. When there is an immediate life-threatening decision that cannot be managed from the field it was decided that the stroke patient should be transported to the closest hospital for stabilization. The Stroke Field Triage Guidelines with the group's changes are shown on attachment 2.

Inter-facility Transfer Protocols

STROKE WORK GROUP

The group reviewed inter-facility transfer protocols that have been drafted at prior meetings. The decision was made to have one tPA transfer protocol regardless of the level of hospital from which or to which a patient transfer occurs. The group determined that it would be appropriate for the protocol to list items that staff should communicate for patient hand-off. Added to this listing was the task to verify whether computed topography (CT) films or a compact disc are being sent with the patient and to confirm peripheral IVs. Modifications were made

regarding the transport care for the patient handoff to the receiving facility. Attachment 3 shows the modified protocol based on the group's discussion.

STEMI WORK GROUP

The inter-facility transfer protocol for STEMI patients should be written to minimize time for transfer. This can be done if **one call** can be made by the transferring facility to notify the receiving hospital which then activates all of the receiving hospital's services, e.g., the cardiac catheterization lab, communication between transferring facility physician and receiving cardiologist, and tasks the transferring hospital can do to prepare for timely management of the STEMI patient when he or she arrives at the receiving facility. More discussion is needed on this regarding statewide protocol since regional practices vary. Modifications were made on the general inter-facility transfer protocol (attachment 4) but time did not allow the group to complete the discussion. Those interested in helping to finalize this protocol were asked to indicate that on the sign-up sheets or on the individual sign-up form.

Helicopter Early Launch Process Guidelines (HELP)

Both the stroke and STEMI work groups discussed the HELP guidelines (attachment 5). Both groups concluded that the dispatch personnel would not have sufficient information to determine if the patient was having a stroke or STEMI so would not be in a position to alert an early launch of helicopter services. It was recommended that this determination be made by ground EMS personnel.

Continuation Plans

Meetings will be arranged during the summer months to finalize the draft regulations for both stroke and STEMI centers and compile professional education and quality assurance plans. The Department will also host regional meetings at the end of the summer or early fall to gather input on the draft regulations and guidance materials being developed. The public education work group will also begin meeting in the fall to develop a plan for implementation when centers become designated as stroke and STEMI centers. Those interested in participating in these meetings were asked to sign the roster sheets for the respective work groups and complete individual forms. The implementation of these tasks will be staged so the professional education and resource supports are available prior to the beginning of the center designation process.

Attachment 1

Stroke and STEMI Meeting Highlights
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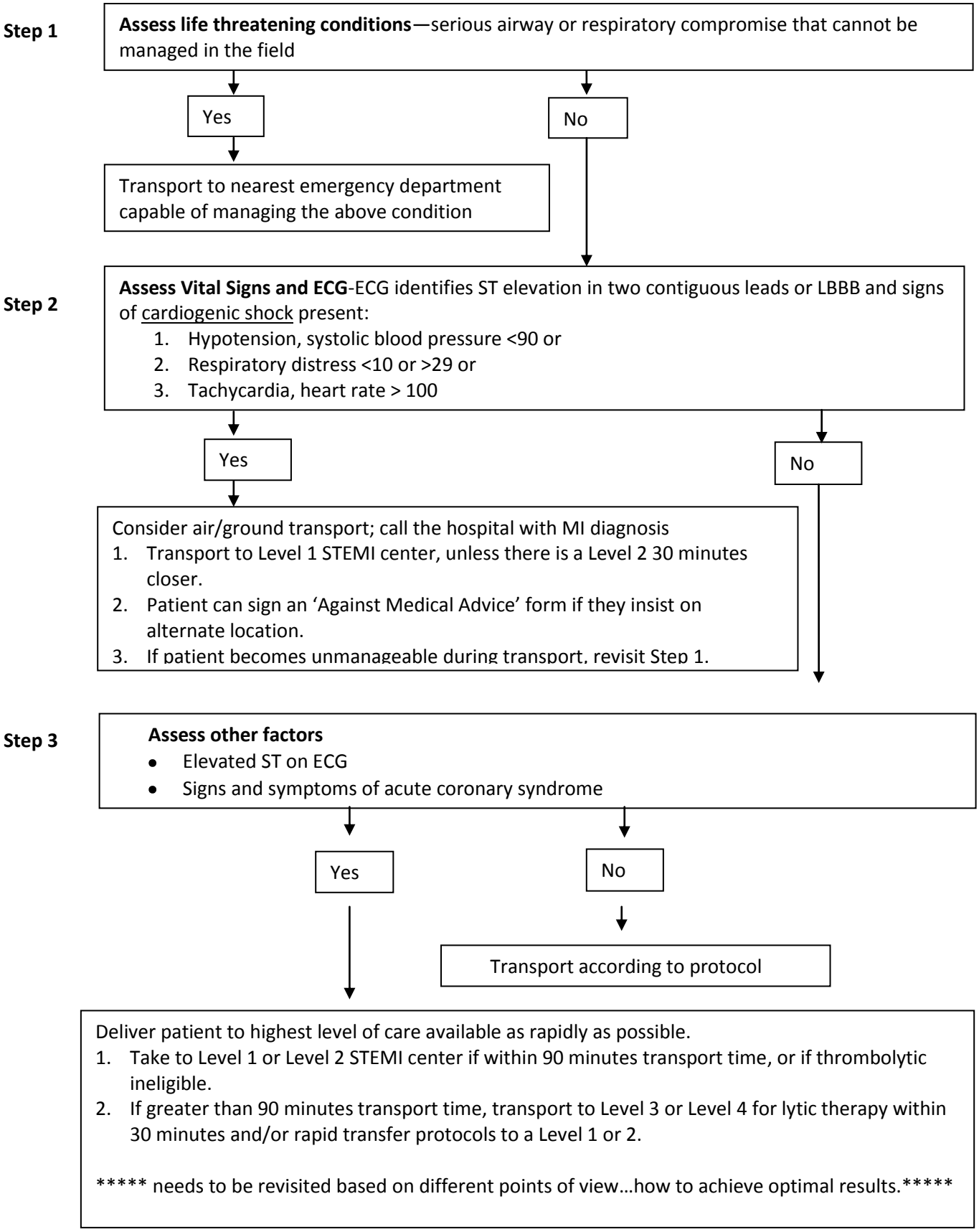
STEMI FIELD TRIAGE GUIDELINES



Attachment 2

Stroke and STEMI Meeting Highlights
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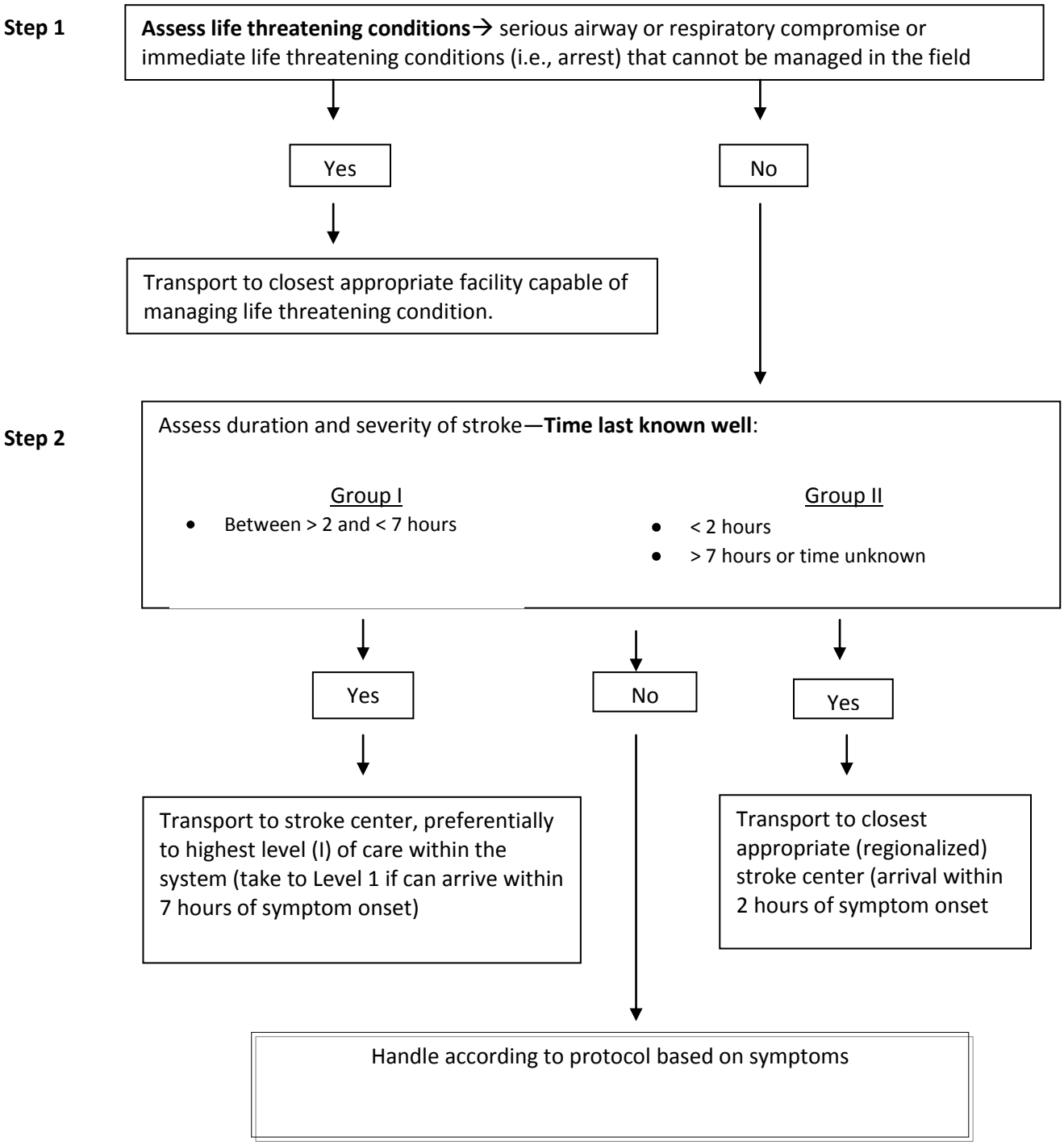
Stroke Field Triage Guidelines



Attachment 3

Stroke and STEMI Meeting Highlights
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GENERAL STROKE INTER-FACILITY TRANSFER PROTOCOL-NON tPA

- Do not delay transport.
- Time last known well/normal
- Neuro exam (signs/symptoms)
- CT – bleed? yes/no
- ABC's (follow Airway/Oxygenation Protocol).
- (add EMT protocol)

- Time transportation was called
- Type of transport (air/ambulance)
- Lab results (glucose, platelets, creatinine, and INR) – draw/run
- Exclusions/Inclusions
- Communication - Receiving hospital notified, transfer accepted?
- Strict NPO
- Obtain vital signs
- Copy of records/films, medication list
- Blood pressure management guidelines
- No ASA or Heparin
- Antiemetic
- Contact info
- Current medications
    - Rate
- Preferably 2 #18 IV lines or access
    - AC
    - NS
- Protocol guidelines for neurological deterioration en route

STROKE INTER-FACILITY TRANSFER PROTOCOL-tPA ADMINISTERED (FDA Approved Stroke Lytics)

Note—group determined that all steps and information on the prior page are to be included.

Patient Care Communication Hand-off

1. Obtain a phone number where someone knowledgeable of the patient's current condition and health history can be contacted immediately (preferably a cell phone).
2. Time Stamps/documentation
3. Ongoing orders
4. Contact information for sending and receiving facilities (sending/receiving report/accepting physician)
5. Verify whether CT films or CD are being sent with patient (do not delay transport if not readily available)
6. Record NIH Stoke Scale if available.
7. Specific location destination (room, department)
8. Confirm 2 PIVs (preferably 18ga AC)

Time stamps

1. Last known well (normal)
2. Arrival time
3. CT (when completed and when read/reviewed)
4. Document and review with transport team: lytics bolus, infusion, and expected completion time (establish tPA protocol/tool kit).
   Documentation of every 15 minute neuro checks and vital signs.

During Transport

1. **If condition deteriorating during transport,** discontinue lytics and contact receiving hospital for medical control.
2. Documentation of every 15 minute neuro checks and vital signs.
3. If blood pressure greater than 180/105, contact receiving hospital.
4. Patient should be transported with head flat, unless risk of aspiration is present.
5. No anti-platelets, no anti-coagulants.
6. Call receiving unit 10 minutes prior to arrival.

Upon Arrival

1. Patient handoff to receiving facility should include:
   - Patient assessment and condition upon arrival, including time of onset;
   - Care provided;
   - Status of tPA (all in?);
   - Changes in condition following treatment and specific immediate family contact information.

Attachment 4
Stroke and STEMI Meeting Highlights
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Emergency Inter-Facility Transfer Protocol for STEMI Patients

PURPOSE
To establish guidelines regarding emergency transfers of STEMI patients.

POLICY

EMS agencies will treat STEMI patients being transferred from one hospital to another for immediate treatment by a STEMI center as an emergency transfer and immediately send the closest unit available.

PROCEDURE

1. When a request for an emergency transfer of a STEMI patient comes in to the Dispatch center, the call taker shall ask the caller if the patient is ready for pick-up at the time of request for transport (including paperwork completed and copied).

2. The closest unit shall be dispatched immediately.

3. EMS units shall respond to the originating facility without the use of emergency lights and siren unless they are specifically requested.

4. A paramedic/ALS provider shall be in attendance with the patient. If a paramedic/ALS provider is not available, a licensed registered nurse or physician shall accompany the patient. In the event a patient develops an unmanageable life-threatening situation while en route, contact the closest hospital and obtain orders and/or authorization to divert to that facility.

5. The EMS unit shall contact the receiving hospital and advise them of the estimated arrival time.

Attachment 5
Stroke and STEMI Meeting Highlights
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Helicopter Early Launch Process Guidelines
SAC Air Ambulance Subcommittee

Definition: Helicopter Early Launch Process (HELP) is the request for an air ambulance response prior to EMS arrival on scene.

I. **Trauma Patient**: The Helicopter Early Launch Process for the trauma patient should be considered when transport by ground EMS to the closest appropriate trauma center will require greater than 30 minutes from the time of dispatch **and one or more of the following criteria** are met:

A. Anatomical Criteria

- All penetrating injuries to head, neck, torso, boxer short and T-shirt coverage areas, and extremities proximal to elbow and knee
- Airway compromise or obstruction, flail chest, hemo- or pneumothorax, patients intubated on scene
- Two or more proximal long-bone fractures, open or closed
- *Crush, degloved, pulseless, or mangled extremity (leave all here?)*
- Amputation proximal to wrist and ankle
- Pelvic fractures *(need to further specify?)*
- Open or depressed skull fractures
- Paralysis or signs of spinal cord or cranial nerve injury
- Active or uncontrolled hemorrhage
- *BURNS: ADULTS: Major burns >20% BSA or any signs of inhalation injury*
- *PEDS: BURNS > 10% BSA or any signs of inhalation injury*
- *PEDS* other:
    - Maxillo-facial or upper airway injury

B. Biomechanics of Injury/Evidence of high energy impact? (include or not to include)

- Falls
    - Adults: > 20 ft (one story = 10 ft.)
    - Children: > 10 ft. *[or 2-3 times height of the child- confirm why delete?]*
- High-risk auto crash
    - Intrusion: > 12 in occupant site; *[> 18 inches in any site- confirm why delete?]*
    - Ejection (partial or complete) from automobile or rollover
    - Death in same passenger compartment
    - Vehicle telemetry data consistent with high risk of injury or highway speed
- High-risk Pedestrian, Cycle, ATV Crash
    - Auto v. Pedestrian/bicyclist thrown, run over, or with significant (> 20 mph) impact
    - Motorcycle or ATV crash > 20 mph with separation of rider
- *All open (non-long bone) fractures*
- *Amputation distal to wrist or ankle of two or more digits*
- *Penetrating injuries from elbow to wrist and knee to ankle*
- *Assault with other than brief Loss of Consciousness (? Define time span)*
- Pregnancy with acute abdominal pain and traumatic event
- Burns with associated trauma
- PEDS other:
    - Seat Belt Sign

- Unrestrained child 8 years of age or younger
- 2 or more extremity fractures

II. **Burn Patient**

1. Greater than 20% body surface area burned
2. Inhalation Injury (closed space – facial burns)

III. **Medical Patient**

1. Severe Chest Pain
2. Uncontrolled Bleeding
3. Poisoning/overdose, especially with decreased level of consciousness
4. Respiratory distress
5. Anaphylaxis/severe allergic reaction
6. Significant mental status change
7. Continuous seizure

An air ambulance should be considered when it will assist the **Time Critical Diagnosis patient** in arriving at the appropriate facility during the time window specific to the disease.

IV. **Suspected Stroke:** Helicopters for the stroke patient should be considered when ground EMS determines that helicopter transfer to a stroke center will result in acute intervention with intravenous or intra-arterial therapy.

V. STEMI patient: Helicopters for the STEMI patient should be considered when ground EMS determine that the closest appropriate STEMI center is greater than 30 minutes transport time from the time of dispatch

(Dispatch personnel will not be able to determine if the patient is experiencing a STEMI so therefore would not be in a position to authorize early launch of helicopter. It is for this reason that the work group recommended that this decision be made by EMS upon arrival and assessment.

Local HELP policies and procedures should be established with the approval of the ground emergency medical response agencies and consistent with existing Revised Statutes, Chapter 190, Emergency Services Section 190.134.

Note: These guidelines were developed by the Air Ambulance Subcommittee to be used by agencies that incorporate early launch into their protocols.